SUPPLEMENT
TO
OBSTETRIC TABLES,
BY
T. SPRATT,
Surgeon-Accoucheur.

SUPPLEMENT

TO

OBSTETRIC TABLES:

COMPRISING

GRAPHIC ILLUSTRATIONS,

WITH

DESCRIPTIONS AND PRACTICAL REMARKS;

EXHIBITING ON

DISSECTED PLATES

MANY IMPORTANT SUBJECTS IN

MIDWIFERY.

BY

G. SPRATT, Surgeon-Accoucheur.

London:

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MDCCCXXXV.

TO

MICHAEL RYAN, M.D.

LECTURER ON THE PRACTICE OF MEDICINE, MIDWIFERY, ETC. ETC.

SIR,

A feeling of gratitude for your kindness on many occasions, in promoting the completion of this volume, would alone have prompted me to inscribe it to you, had not a less personal feeling induced me to do so—the very high opinion I hold, in common with numbers of my medical brethren, of your eminent talents as an obstetrician, and your persevering zeal in the promotion of obstetric science. With these feelings, I respectfully dedicate this Supplement to you. That you may long continue to diffuse your knowledge for the instruction of others, and for the advancement of the science, is the ardent wish of,

SIR,

Your very much obliged

and obedient, humble Servant,

THE AUTHOR.

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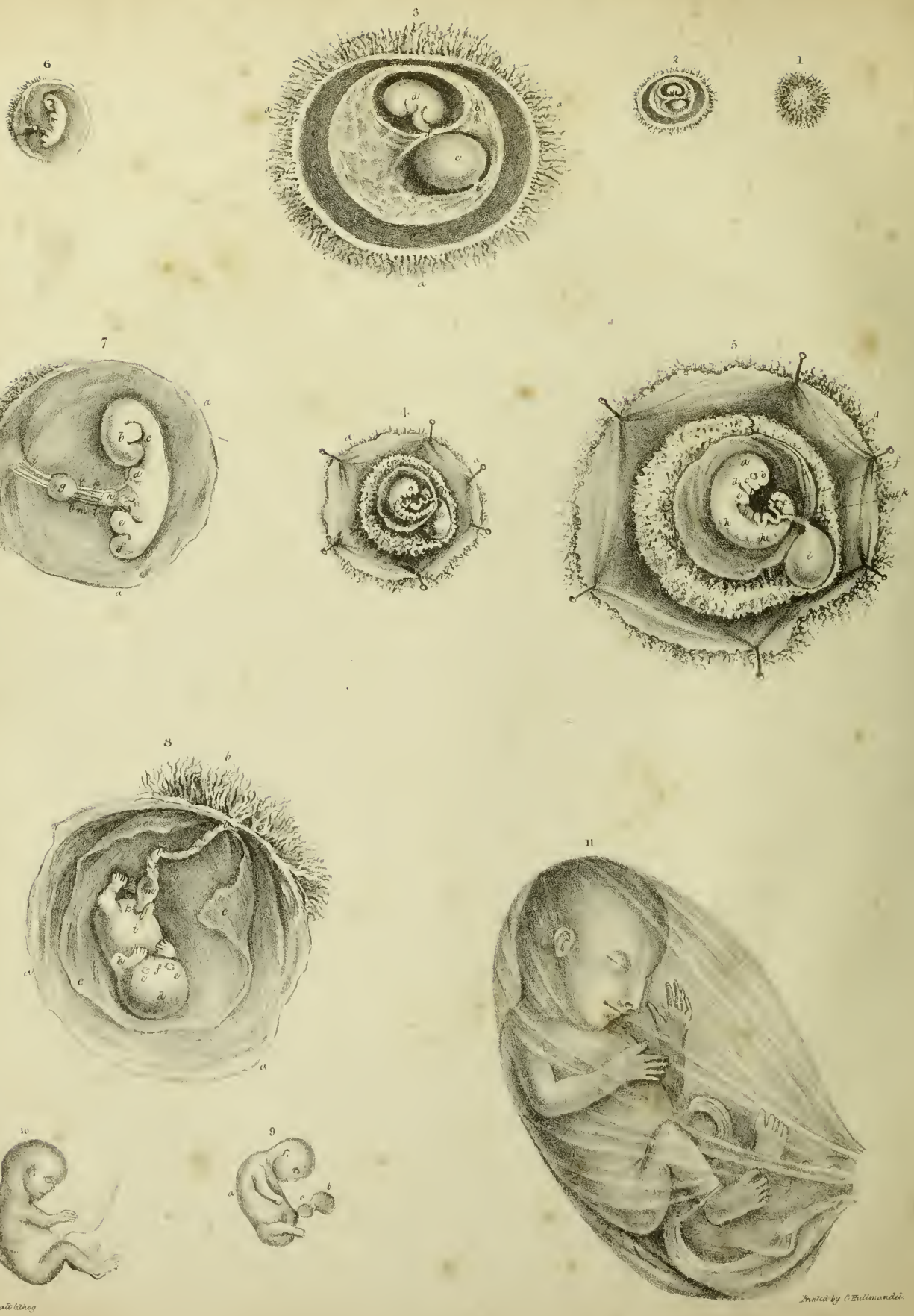

TABLES I AND II.

ILLUSTRATING THE DEVELOPMENT OF THE OVUM AND FŒTUS.

PRELIMINARY OBSERVATIONS AND REMARKS.

To investigate the subject of conception would be foreign to a purely practical work on obstetrics; but the subject of reproduction of the human species is so deeply interesting, that we think a *brief outline* of the modern physiological theory of impregnation, and the progressive growth of the fœtus to maturity, will not be misplaced, nor prove uninteresting to many of our readers. The works of Blumenbach, Ryan, Velpeau, Spallanzani, and many others, may be consulted by those who wish to investigate minutely this interesting subject. That conception should follow sexual congress, it appears essential on the part of the female that the ovaria contain some of their vesicles in a healthy condition; on the part of the male, that the testes be in a healthy state. The male semen being transmitted through the uterus, and by the tubæ Fallopianæ to the ovaries, stimulates one of the vesiculæ Graafianæ, which contains the ovum or germ.*

When fecundation takes place, the fimbriated extremity of one of the tubes expands and embraces the ovary, the impregnated ovulum bursts and escapes, with its external envelope, together with a small portion of the liquid peculiar to the Graafian vesicle, and thus it passes into the Fallopian tube, along which it is conveyed into the uterus. The precise time at which the ovulum enters the womb after fecundation is not known. Although it is generally supposed to be about a week or two in its journey from the ovaria to the cavity of the uterus, it appears probable that the time may be much shorter. It is said to have been detected in the uterus so early as the eighth day, by Home, Walker, and others. Dr. Granville states that he saw a perfect ovulum ejected from the womb fourteen days after a single sexual congress, which had taken place the day after the cessation of the menses.†

The ovulum contains the primordial parts of the fœtus, though on its first entrance into the uterus they can scarcely be detected, on account of their minuteness and transparency. It has two membranous coverings, having a gelatinous substance interposed between them, the chorion and amnion‡, the former being the outer, the latter the inner covering: these, with a fluid (liquor amnii) secreted by the amnion, constitute the ovum.

* An ovulum exists in each of the vesicles of Graaf, which the ovarium contains in women whohave reached maturity.

† Granville's Graphic Illustrations of Abortions, &c.

‡ Velpeau says this membrane does not exist before the twelfth day.

From the moment of conception, the internal surface of the uterus acquires an increased action, and secretes a delicate, lacerable, and cribri-form membrane (decidua) which may be divided into two laminæ, the one in contact with the uterus, the other with the ovum.

According to Prevost, Baer, and Dumas, the blood is formed independently of the heart. The arteries, veins, and heart, are formed successively. The development of the nervous system commences from the circumference of the embryo, proceeding towards the centre; hence the lateral nerves of the head, trunk, and pelvis, are developed, whilst the cerebro-spinal system is yet in a liquid state.

Of the digestive organs, the intestinal canal is the first to appear: it consists, during the first days of its formation, of a curved open tube, extending the whole length of the embryo, placed before the vertebral column. It communicates with the vesicula umbilicalis.* It extends and expands, and its superior extremity, the mouth, opens about the fourth or fifth week; the inferior extremity, the anus, opens about the seventh: the outlines of the stomach are visible about the ninth week.† Before the seventh day we cannot perceive any thing in the uterus which indicates the presence of a new being. On the tenth day a semi-transparent, greyish flake may be perceived, of an indeterminate form.‡ From the twelfth to the thirteenth day, the presence of a vesicle, the size of a pea, containing a thick fluid, in the middle of which swims an opaque spot, presents the first lineaments of the new being that bears the name of *embryo:* it is enveloped by the membranes *chorion* and *amnion;* the weight is equal to one grain.

The embryo may be perceived with the naked eye at the fourteenth day after conception (vide fig. 1, 2, & 3, Table I). On the twenty-first day, it resembles, in form, a large ant or lettuce seed (Burton), its length is from 4 to 5 lines and weight from three to four grains: at this period the different parts of the fœtus present a little more consistence, and those which are to form bones pass into a cartilaginous state (vide fig. 4 & 5). On the thirtieth day it is about the size of a horse fly, and resembles a worm bent together; at this period we may perceive, although faintly, some traits of the principal organs; the head appears as large as the rest of the body; there is also, in the former, black dots marking the spots for the eyes; its weight is from nine to ten grains, and its length from ten to twelve lines (vide fig. 6 & 7). At the period of forty-five days, the development of the fœtus in various parts becomes well determined, the superior and inferior extremities appear under the form of globular tubercles, the former preceding the latter by a short period of time; the body lengthens, but keeps the ovoid figure; blackish spots indicate the presence of the eyes, the mouth, and the nose; weight one drachm, length one inch.§ At from sixty to seventy days, the various parts of the fœtus become progressively developed, the black spots which represent the eyes enlarge, the eyelids are visible, the nose becomes a little prominent, the mouth enlarges, the external concha of the ear becomes distinctly delineated, the brain is soft and pulpy, the neck is defined, and the heart is fully developed. At ninety days, three months, the development of all the essential parts of the fœtus becomes perfectly defined;

* Meckel, Wolf, Oken. † Velpeau.

‡ The precise time at which the ovulum enters the womb is not exactly known.

§ The measure and weight vary more or less during every period of pregnancy.

the eyelids are distinctly delineated, but closely shut: the lips are very distinct and drawn together, the organs of generation are exceedingly prominent in the male as well as in the female, the penis in the former and the clitoris in the latter are remarkably elongated.* The heart beats with force, and the larger vessels carry red blood; the fingers and toes are defined, the muscular system begins to characterise itself: weight, about two ounces and a half; length, from four to five inches.

At one hundred and twenty days, or four months, the development of the fœtus in all its parts is remarkably increased, the brain and spinal marrow acquire more consistence, the muscular system is distinct, and here and there we meet with some cellular tissue. The abdomen is fully covered in, and the intestines are no longer visible; in the latter, a little meconium collects; weight, seven to eight ounces.

At one hundred and fifty days, or five months, the development of every part of the fœtus is very considerably increased; the lungs enlarge, and are susceptible of experiencing a certain dilatation. The cutaneous envelope acquires at this period much consistence, the epidermis is stronger and thicker, the situation of the nails are determined, and the meconium is more abundant and lower in the intestines; length, eight or ten inches; weight, fourteen or sixteen ounces; intellectual faculties void.

At one hundred and eighty days, six months, the fœtus is increased in its shape and formation, the nails are marked, a little down appears on the head, the first indication of hair; the cellular tissue is abundant, and a little adipose substance is deposited in its cells: length, from nine to ten or twelve inches; weight, from one and a half to two pounds; intellectual functions void.

At two hundred and ten days, seven months, every part of the fœtus has progressively increased in volume, size, and weight; the nails are formed, the hair appears, the testicles descend, the meconium increases in the large intestines, and the bony system is nearly complete: length, from twelve to fourteen inches; weight, two and a half to three pounds; intellectual functions void.

From the seventh to the ninth month, the successive development of the fœtus is limited to mere weight and size.† At the period of nine months, the cutaneous, arterial, and capillary systems become very active, the skin appears coloured, and the perspiration is established. The intellectual functions void; but the animal functions are well developed, especially that of taste; the child is sensible of pain, of hunger, and of heat and cold: weight, from five to eight pounds; length, from eighteen to twenty-two inches.

* The difference of sexes may be known from other circumstances besides the sexual organs, such as the particular formation of the head, extremities, thorax, abdomen, and dorsal spine.

† Although the growth of the various parts of the fœtus bears a proportion to the general development of its body, that part of the body which is below the navel measures in length less than the part above it, until the full period of gestation, when the navel marks the precise centre of the fœtus. This circumstance will assist us in forming an opinion respecting the age of any fœtus. (Foderé, Chaussier.)

DESCRIPTION OF TABLES I AND II.

Fig. 1.—An ovum from eight to twelve days, of the natural size. The flocculent surface of the chorion is readily distinguished, and occupies the whole of the circumference.

Fig. 2.—An ovum of about twelve days, laid open.

Fig. 3.—A magnified view of the same ovum.

a.a.a.—The villous surface of the chorion.

b.b.—Reticulated magma or the allantois,* placed between the chorion, *c.c.c.* and the amnion *g*.

d. The embryo. *e.* The umbilical or intestinal vesicle.†

f. The umbilical cord.‡

Fig. 4.—An ovum of about twenty-one days, laid open.

a.a.a. The chorion spread open and retained by the pins.

b. The amnion open, leaving the embryo to be seen completely bare.

Fig. 5.—The same ovum (fig. 4) magnified.

a. The head of the embryo. B. The eyes. *c.* The mouth.

* The allantois is a vessel or sac which projects from the lower end of the anal intestines; it appears about the fourth week, and by the sixth it has nearly disappeared; it communicates with the bladder by the urachus (a canal) which is found impervious after the first three or four months of gestation. (Meckel, Dutrochet, Baer, and others.)

† The umbilical vesicle measures about half an inch in length; it is situated immediately against the anterior surface of the embryo, but gets further from it at the end of the first month, when it is found on the outside of the sheath of the cord. It is composed of a granular membrane; it contains a whitish liquid, which gradually becomes thicker, and ultimately hardened. The vesicle withers and becomes opaque; it receives the omphalo-mesenteric vessels. It disappears about the third month.

‡ The umbilical cord appears about the end of the third week, and then consists of a vein and two arteries, the urachus, a species of gelatine of a ropy nature, a portion of the intestinal canal, (larger in proportion as the embryo is younger,) the vesicula umbilicalis in part, and the omphalo-mesenteric vessels. The three last disappear after the third or fourth month of gestation.

d. The neck. *e.* The superior, or thoracic extremities.
f. The abdominal, or inferior extremities.
g. The extremity of the coccyx. *h.h.* The arch of the spine.
i. The region of the liver.
k. The pedicle of the umbilical vesicle. *l.* The vesicle.

Fig. 6. An ovum of the natural size, laid open, about twenty days old.
Fig. 7. A magnified view of fig. 6, *a.a.a.* The circumference of the chorion, with a portion of its flocculent surface, to be seen on one side.

b. The head of the embryo greatly bent forward.
c. The mouth already very visible.
d. The thoracic tubercles, or rudiments of the superior extremities.
c. The abdominal tubercles, or rudiments of the inferior extremities.
f. The point of the coccyx.
g. The remains of the vitelline liquor, contained in the umbilical vesicle, hardened and forming a tumour.
h. Remains of another small vesicle which was formed near the ring of the umbilicus.
i.i. Umbilical vein. *e.e.* Umbilical arteries.
m.m. Omphalo-mesenteric vessels.*

Fig. 8. An ovum, of from five to six weeks, laid open.
a.a.a. The circumference of the chorion. *b.b.* Villosities of the placenta.
c.c.c. The amnion. *d.* Head of the embryo. *e.e.* The temples.
f. Root of the nose, or interval between the eyes. *g.* The right ear.
h. The superior extremities. *j.* The inferior or pelvic extremities.
i. The abdomen. *k.* Sexual organs.
b.b. The umbilical cord, already turned spiral.
m. The swelling containing the intestinal portion.

Fig. 9. A fœtus of the age of forty-five days.

* These vessels consist of an artery and vein, they accompany the cord as far as the navel, through which they pass into the abdomen. These vessels disappear as the vesicula umbilicalis becomes obliterated.

Fig. 10. A fœtus of the age of two months or sixty days.

Fig. 11. A fœtus, of the age of three months, enclosed in the amnion.

Fig. 1. (Table II.) A fœtus of the age of four months.

Fig. 2. (Table II.) A fœtus of the age of five months, with the placenta and membranes. The chorion is laid open to exhibit the fœtus enveloped in the amnion. The amnion is seen attached to the centre of the internal surface of the placenta, through which the navel cord passes. The external surface of the placenta is seen covered by the chorion and decidua.

TABLE 2.

1.

2.

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TABLE III.

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TABLE III.

ILLUSTRATING THE FEMALE ORGANS OF GENERATION.

A. The Mons Veneris.

B.B. The Labia externa, majora, vel pudendi.

C. The Perineum anticus.

The Mons Veneris is a prominence situated on the Symphysis Pubis, arising from each side of the groin, composed of common integuments, fat, fibrous, and cellular substance, and numerous sebaceous follicles. Its breadth is about two inches, and covered with hair after puberty. The inferior part bifurcates to form the Labia externa.

The Labia externa take their rise from the termination of the mons veneris, and descend to the perineum anticus, where they unite and form the fourchette or frænum (marked D in the drawing). The points at which the labia unite above and below are called *superior* and *inferior* commissures, and the fissure formed by the labia is called the genital fissure, or sinus pudoris, vulva or pudendum. The labia are composed of common integuments, cellular substance and fat, and are covered with hair after puberty. Their internal surfaces are smooth, of a pink colour, and supplied with numerous sebaceous and mucous follicles.*

The Labia are dense and in opposition before puberty; but become elongated, less dense, and bluish, after marriage.

The Labia are sometimes found united at birth. The surface of the Labia very frequently cohere, so as to close up the genital fissure, leaving only a small opening for the passage of the urine. This cohesion is not unfrequently caused by uncleanliness in those who are attacked with excoriation or ulceration.

On separating the *Labia externa*, the *Clitoris*, *&c.* are brought into view.

A. The *Clitoris*. B.B. The *Nymphæ*, or *Labia minora*. C. The *Hymen*. D. The *Meatus urinarius*. E. The orifice of the Vagina.

The Clitoris is an elongated substance, about two inches in length, formed of two cavernous, spongy, vascular bodies. It has a round, free

* These follicles sometimes give rise to an acrid discharge, not unfrequently mistaken for gonorrhœa.

extremity, called its glans, which is enveloped by skin or prepuce, which terminates in the Labia minora. It resembles the male penis; it becomes erect during coition, and is the principal seat of voluptuousness. The Clitoris arises from the ischia-pubic branches, and is attached to the pubis by a suspensory ligament.

The Clitoris sometimes increases to the length of four or five inches. The Clitoris is sometimes the seat of cancer and cauliflower excrescence.

The *Nymphæ*, or *labia minora*, are two continuations from the prepuce of the clitoris and *labia externa;* they diverge and descend on either side to about the middle of the *labia externa*, where they terminate insensibly on the internal surface. They are formed of fine thin vascular and spongy tissue, and consist internally of adipose and cellular tissue; they are firm, and of a reddish colour.

The nymphæ in some persons are naturally elongated, and in some countries, as Hindostan, Persia, and Turkey, they produce so much inconvenience as to require extirpation. In the fœtus, and at birth, the *nymphæ* pass the *external labia;* in virgins, they are hidden within the *vulva;* but, in women who have had children, they become elongated, less firm, and lose their rosaceous colour.

Meatus urinarius, or orifice of the urethra, is a small round aperture, situated about an inch below the *clitoris*, and about one third of an inch above the entrance into the vagina; it is surrounded by small depressions called lacunæ.

The situation of the orifice of the urethra demands particular attention, on account of the introduction of the catheter. The best position for introducing the catheter, is for the patient to lie on her back with her knees separated and elevated. The operation will be best performed by the operator standing on the patient's right side, with the catheter, previously oiled, in his right hand, then to carry his left hand over the right thigh of the patient, and with the index finger to separate the labia and nymphæ, the finger must then be passed downward about an inch below the clitoris, till it arrives at the orifice of the urethra. The right hand, with the catheter, is to be carried under the patient's thigh, and the point of the instrument directed to the extremity of the index finger, when, with a little dexterity, it readily slips into the urethra. The relative positions of the parts are so much altered in cases of procidentia and inversio uteri, "that, although the catheter must be introduced and carried forwards to the pubes, with the point directed in the usual course, yet, when it has reached the symphysis, its handle must be so elevated towards the abdomen, that the extremity of the instrument should be directed towards the knees. Under other circumstances, such as the bladder being over the pubes, when the

abdomen is pendulous, the handle must be as much depressed, immediately after the point has cleared the symphysis pubis."* Previous to introducing the catheter, the stilette should be withdrawn, and a moistened bladder tied on the extremity of its handle, into which the urine may flow. This plan prevents the bed being wetted, which is an almost unavoidable circumstance, as the operation is commonly performed.

The *vagina* is the canal which extends from the genital fissure to the uterus, passing between the *bladder* and *rectum*. In the virgin state, it is about one inch in diameter, but much more capacious in married women, and those who have had children; it is capable of great contraction and dilatation. It is from three to five inches in length; the superior or upper part encircles the cervix uteri.

The vagina is lined by a mucous membrane, which affords a secretion which prevents adhesion of its surfaces. This secretion is increased in leucorrhœa.

Fig. 2.—On folding down the part marked D, the uterus, &c. are brought into view.

A. The fundus of the uterus. B.B. The round ligament, the left of which is seen passing through the ring of the external oblique muscle C, and terminating on the mons veneris. E. A portion of the small intestines. C. A portion of the external oblique muscle turned aside, to shew the uterus in its situation.

D.D. The iliac arteries, veins, and nerves.

The *uterus*.† This organ is situated between the bladder and rectum, it is destined for the reception of the fœtus. The form of the unimpregnated uterus is somewhat pyreform; when impregnated, its shape is oval. The uterus is divided into fundus, corpus, and cervix; the fundus is that portion which is above the insertion of the fallopian tubes; the corpus is the portion between the fundus and cervix, and the latter is the narrow portion below the corpus or body. The unimpregnated uterus‡ is about three inches in length, two inches in breadth at the fundus, and one inch at the cervix. The cavity of the uterus is somewhat triangular, and is lined by a continuation of the villous covering of the vagina. The substance of

* Conquest's Outlines.

† Fig. 1. Table IV, in the Obstetric Tables, represents the unimpregnated uterus and its appendages.

‡ See fig. 1. Table IV, Obstetric Tables.

the uterus is composed of muscular fibres, nerves, arteries, veins, and absorbents, connected by dense cellular structure. Its nerves are supplied from the meso-colic plexus, the sacral and great sciatic. Its arteries are four, two spermatic and two hypogastric : these vessels freely anastomose.

The *ovaries* or seminal glands of the woman, the secreting organs of the germ, are situated near the sides of the uterus, enclosed in the posterior fold of the broad ligament, are oblong, oval, about the size of a bean or almond, and of a yellow grey colour, and contain the ova, in number from eight to twenty. At puberty, the ovaries become developed and active, and, by sympathy, produce a series of changes in the uterus, mammæ, larynx, &c.

The uterine tubes, (Tubæ Fallopianæ), are two small canals, arising from the lateral angles of the fundus of the uterus, four or five inches long, and about the size of a goose-quill ; they pass through the middle fold of the broad ligament.

Fig. 3.—On turning down fig. 2, the uterus is represented in situ. A. The uterus. *b.b.* The fallopian tubes, fimbriæ, and ovaries. C. The bladder. *d.* The rectum passing down behind the uterus. *e.e.* The round ligaments. *f.f.* The broad ligaments.

We must observe, that, to have this and the former view of the contents of the pelvis, (fig. 2), it is necessary that the pelvis be placed horizontally; otherwise, the uterus, &c. would appear to be placed somewhat too high.

Fig. 1.

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TABLE IV.

ILLUSTRATING THE SIGNS OF THE DIFFERENT EPOCHS OF PREGNANCY.

Signs.—Pregnancy may be distinguished by presumptive or rational signs, and positive or sensible signs. The signs presumptive or rational, are those which cause a belief or supposition that pregnancy exists. Although numerous, these signs are very uncertain, and we can only form conjectures by their presence. Among these signs, are those which affect the entire economy: these are the general presumptive signs. There are others which manifest their presence on a point far removed from the economy: these are the particular or local signs. The first are drawn from all the changes that a woman experiences in the regular and natural functions, in her habits, her longings, and her particular fancies, the effects of which are marked by the paleness of the face and a certain alteration in the features which belongs alone to pregnant women, but which the most experienced eye cannot always recognise.

The particular or local signs are of a more positive nature: alone, they do not indicate to a certainty the reality of pregnancy; but they deserve all the attention of the practitioner. These signs are, first, the suppression of the menses; 2nd, the enlargement and expanding of the abdomen; 3rd, the discoloration and brownish appearance of the areola, the swelling of the breasts, and the moisture from the nipple.

There are two remarkable circumstances in the life of women, during the time the monthly courses are suppressed without the health being sensibly affected: these two circumstances are, pregnancy and suckling; but far from the suppression of the menses being a positive sign of pregnancy, it is not always even a rational sign—nothing being so variable or so subject to derangement as this evacuation; any more than its constant and regular appearance is a formal proof that the woman is not pregnant, since there are numerous examples which demonstrate that, although pregnant, some women have not ceased to menstruate, at least during the first months of gestation.

So soon as a woman perceives that her abdomen enlarges and expands, she thinks herself pregnant; above all, if these signs are accompanied by the suppression of the menses.

It is true that pregnancy causes the enlargement and expanding of the abdomen; but causes foreign to pregnancy, which may produce this appearance, are too numerous to allow us to accord to this sign all the value which it merits in the case of a true pregnancy.

Besides, the abdomen does not visibly enlarge until after the third month; and as the feeling at this short period of pregnancy can only furnish vague data, we must only pronounce with much reserve upon the enlargement of the abdomen, even as a rational sign of pregnancy.

Later, and when pregnancy is far advanced, the size of the abdomen adds little to its certainty; other signs, more positive, leave no doubt about its presence.

The sympathy which exists between the uterus and the breasts explains sufficiently the influence that pregnancy exercises upon the latter. In general, this influence is not felt till towards the fourth month, nor is it discontinued until the accouchment, a period when the functions are established in these organs. However, it is not uncommon to see the breasts swell from the beginning of pregnancy, and even furnish by the nipple a secretion sufficiently distinguished. It is these anomalies which throw such uncertainty upon the swelling of the

breasts as presumptive signs of pregnancy; although it is certain that it is one of the least equivocal, because it is uncommon, in false pregnancy, that the causes which occasion them produce upon the breast the same effects as true pregnancy. Alone, however, the swelling of the breasts and the secretion from the nipple would be far from being sufficient motives for believing in the presence of pregnancy; since we have examples in women who were really not pregnant, and with very young girls, where these phenomena were present.

4th. The dark brownish color which encircles the *areola* and the nipple is generally enough looked upon as a sign of pregnancy; because it is demonstrated that the dropsy, and all other circumstances which may produce the enlargement of the abdomen, have no action upon the breasts, and do not give place to any change of form or color in these organs. However, this sign will not always suffice to ensure the presence of pregnancy.

There are some women having the *areola* dark, and others who, even having had several children, have not experienced any change in this part, it always having remained of a pale pink color, even after many pregnancies.

The sensible signs, positive or demonstrative, of pregnancy, are of two species. The former, which are drawn from the sight and feeling, form its experimental or practical history. They make known the changes that the womb experiences, during pregnancy, in its form, its figure, and its situation: this is what may be called the physical phenomena of pregnancy.

The second are not accessible to our senses; they result from the changes that the womb undergoes in its organization during the course of pregnancy, changes which operate in virtue of common functions of which it is already possessed, and which form the physiological phenomena of pregnancy; these are its true rational signs.

Experimental detail of pregnancy.—At the end of the first month, nothing indicates to the accoucheur, at least in a perceptible manner, not even that pregnancy exists, nor even that the womb may be in a state of plenitude or action; any, that is to say rational, signs, not being yet manifest; and the general accounts given by some authors are too vague to allow us to place much faith in them.

It is not the same at the end of the second month (60 days accomplished). The practice of feeling may, by attention, enable us to distinguish the state of the fulness of the womb, as well as that the slight change made in its form and size make us presume on the existence of pregnancy.

During the whole course of the first month, the womb does not appear to experience any sensible change in its form or size; it is even probable that, far from acquiring any increase, it, on the contrary, contracts, as if it would embrace more closely the new production enclosed in its bosom.

At the end of the second month, its size is sensibly increased, its form is become rounded, it fills up the greater part of the pelvis; but the abdomen, far from enlarging, becomes more contracted, more tender, and sometimes a little painful.

After the third month, its size increases, as also its length, the fundus rises to the height of the region of the pubis and superior aperture or brim of the pelvis.*

* See fig. 2, Table IV.

The finger, introduced into the interior of the vagina, will perceive its form rounded, globular, and equal; it can be raised without making the woman feel any perceptible pain; the abdomen is slightly tumefied by the rising of the intestines, (see fig. 2.); but the neck of the uterus has not experienced any change, and consequently cannot furnish any perceptible sign of pregnancy.

The use of the stethoscope, if it were possible to apply it in the interior of the vagina, could furnish, at this period, valuable results to confirm the existence of an organised body in the uterus.

At the end of the fourth month, the uterus emerges from out of the pelvis; its fundus rises to two or three fingers' breadth above the region of the pubis. The abdomen is sensibly enlarged; but it is at the side of the vagina, by the touch, that we can perceive with certainty the presence of pregnancy. It is not impossible to derive certain information by the ballottement*; the head of the fœtus having acquired at this period sufficient size and weight to obey, in a perceptible manner, the motion impressed upon it. It is not even uncommon that, at the same period, the woman should feel the first motion of her child.

At the end of the fifth month, there no longer remains any doubt as to the presence of pregnancy; all the signs, be them sensible or be them rational, unite in crowds to confirm it. We find the fundus of the uterus on a level with the umbilicus.

Feeling makes manifest the presence of the child, and the touch, executed by a careful and experienced hand, shews it with the greatest facility.

At the end of the sixth month, the rapidity with which the expanding of the uterus operates is such, that the extremity of the organ is raised two fingers' breadth above the *umbilicus;* its usual form is that of an *ellipsis*, greatly lengthened from fundus to cervix. We can easily perceive, by feeling, the head of the child through its distended coats. One particularity characterises the end of the sixth month: the neck, which up to this period had not taken any part in the development of the body and of the fundus of the uterus, begins to experience a little enlargement towards its base, its inferior orifice begins slightly to open, the neck itself, a little tumefied, becomes softer, and every thing announces that it is at length disposed to participate in the general dilatation of the womb.

In the course of the seventh month, the fundus of the womb, which still rises a little, begins to enter into the epigastric region; but its elevation no longer presents the same activity: on the contrary, it keeps decreasing and from the elliptical, the womb tends more and more to take a spherical form, which contributes to the widening of the cervix uteri.

The cervix, in fact, loses more and more of its hardness†, its inferior orifice widens in a very perceptible manner, and we could easily introduce the extremity of the finger into it. It is also at this period that the body of the uterus enlarges, which increases the size of the woman and adds much to her bulk; the touch or ballottement begins to lose its elasticity, the size of the head of the child no longer permitting it to be displaced with the same facility: but this circumstance only tends to render still more evident the pregnancy of which it serves to determine the advanced state.

During the whole eight months, and, above all, towards the end, the fundus of the uterus

* See our Remarks, Plate IV, fig. 2. † Vide Table V, fig. 2.

occupies the greater part of the epigastric region, its bulk is considerably enlarged, and its shape becomes more and more rounded and spherical.

The umbilicus is distended and swollen, the neck loses more and more of its length and of its hardness, it is become soft, swollen above all towards the anterior lip*.

The head of the child is large and heavy, the finger raises it with difficulty, and the ballottement can be no longer executed.

At the end of the ninth month, and consequently of pregnancy, the fundus of the uterus, far from rising more and more as we might suppose, falls lower than it was at the end of the eighth month; we find it near the umbilical region. The cervix uteri is totally effaced, and it no longer presents itself but under the shape of a soft roll or cushion.

The head of the child becomes still larger and heavier, and, as it rests above the superior aperture of the pelvis, it is almost impossible to raise it by the touch or ballottement.

Such is the short sketch of the changes which operate in the form, figure, and size of the uterus, during the whole course of pregnancy.

Although we derive very considerable advantage from attending to the signs of the epochs of pregnancy which are afforded by the development of the uterus, yet none of them are *infallible* before the fifth or sixth month.

An accurate knowledge of the changes which take place in the neck and body of the uterus will, with a careful history of the symptoms, enable us to distinguish pregnancy from ovarian dropsy, tympanitis, moles, polypi, &c.

DESCRIPTION OF PLATE IV.

Fig. 1.—Represents a profile view of the virgin female, to shew the form of the abdomen, breasts, &c. The chief points to be observed in this drawing are the form of the abdomen and breasts, and also the relative size and situation of the uterus. The line enclosing the letter A. denotes the size and situation of the uterus, and the colored space marked B. the course of the vagina.

The uterus is situated in the cavity of the pelvis, betwixt the bladder and rectum, below the small intestines, and above the vagina, in the direction of the axis of the superior strait of the pelvis, and forms nearly a right angle with the axis of the vagina. The os uteri points backwards and downwards, and its anterior lip is lower than the posterior; the direction however will vary a little, as the bladder or rectum may be full or empty.

* See fig. 4.

Fig. 2.—Represents the female in the third month of pregnancy. We are here to observe the increased size of the abdomen, breasts, and uterus, compared with fig. 1. A. the situation and dimensions of the uterus. B. the course of the vagina.

At the end of the third month, the fundus uteri is on a level with the superior margin of the pubis. About the end of the 4th month, the uterus rises to the hypogastrium, and the spontaneous motions of the fœtus are felt by the mother; but some women never perceive them during the whole period of pregnancy, and others imagine they feel the movements of the child when there is no conception.

At the end of the fifth month, the uterus touches the inferior boundary of the umbilical region, and the cervix uteri will, on examination, be found to be considerably shortened. (See fig. 2, Table V. in the Obstetric Tables.)

At this period, the most certain sign of pregnancy is afforded by the touch or ballottement and auscultation: the touch consists of the introduction of the finger into the vagina, and the application of the other hand above the pubis; the uterus will be felt enlarged, and, if a gentle percussion be applied above the pubis, the fœtus will be made to strike the finger, which cannot take place unless there be a fœtus and fluid in the uterus.

Fig. 3.—This figure represents the female at the full period of six months; the enlarged size of the abdomen and uterus, (marked A.) are very conspicuous; the breast is also more prominent, and the nipple elongated.

At this period of gestation, we may call to our assistance auscultation, to enable us to decide if our patient be pregnant. The application of the stethoscope to the abdomen has been considered by some* as one of the most infallible proofs. M. Le Jumeau de Kergaradic has applied the ear and stethoscope to the abdomen, and discovered the double motion of the fœtal heart, and also the pulsation of the placenta, which was synchronous with the maternal pulse.

Morgagni proposes the following plan for discovering the motion of the fœtus:—In warm weather, let the hand be immersed in cold water, and suddenly applied to the abdomen of the female; and, in cold weather, let the hand be immersed in warm water and applied, when the motions of the child will be distinctly felt. Dr. Ryan says, "I have often acted on these suggestions with success."†

At seven months, the abdomen affords a dull fluctuation, which differs

* Dr. Kennedy, of the Dublin Lying-in Hospital, has written in favor of it. Dr. Ferguson, of Dublin, thinks it an unequivocal proof: see Dub. Med. Trans. vol. i, 1830. Dr. Elliotson, is in favor of it. M. Velpeau has tried it in a number of cases without success; and Dr. Negle, of Dublin, thinks it equivocal.

† Ryan's Manual of Midwifery, 3rd edition, 1831.

from ascites; percussion affords a dull sound, which is distinguishable from tympanitis or meteorism. At the end of eight months, the uterus has risen to the epigastrium, the cervix nearly obliterated, round, gaping, thickened, and pointing to the cavity of the sacrum. The limbs of the child may generally be felt through the parietes of the abdomen.

Fig. 4—Represents the female at the full period of gestation, (9 months). The uterus is now fully developed, the abdomen greatly distended, the cuticle, from the great distension, appears smooth and polished; the breast firm and full, and the nipple elongated; the umbilicus projecting, the cervix uteri is obliterated, and the orifice directed towards the sacrum.

Fig. 5.—On raising fig. 5, the full-grown fœtus is seen in utero, presenting in the natural position.

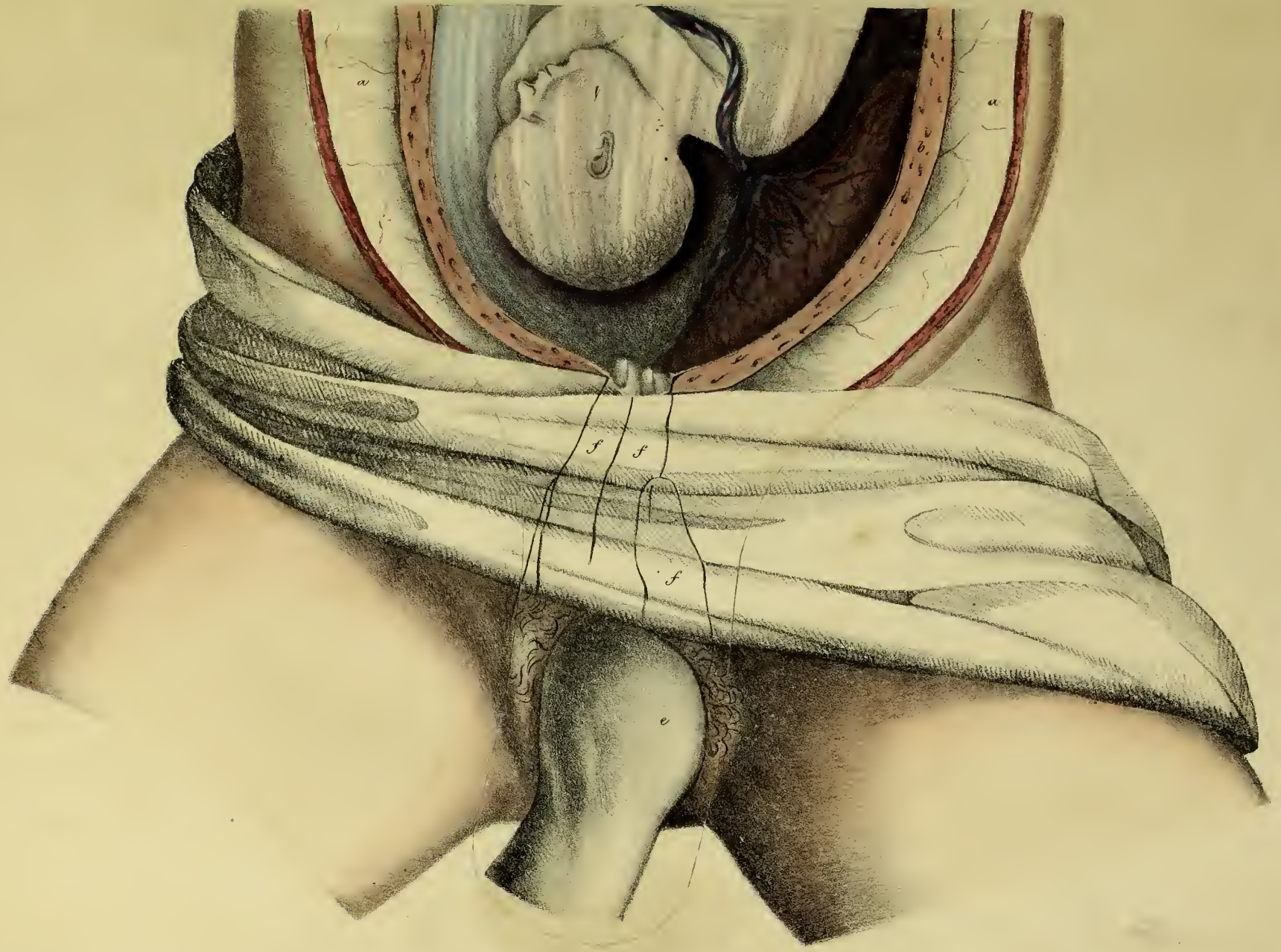

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TABLE V.

ILLUSTRATING PLACENTA PRESENTATIONS, ADHESION OF THE PLACENTA, &c. &c.

Fig. 1—Represents the abdomen and uterus laid open, (the anterior part of the uterus being removed, to shew the placenta, partially situated over the cervix uteri). The fœtus is seen through the amnion. The operator's hand is represented as introduced into the vagina, about to rupture the membranes; the direction of the fingers in the vagina are represented in outline.

A.A. The abdominal muscles, integuments, &c. turned back.

B.B. The cut edge of the uterus. C. The placenta.

D. The fœtus. E. The hand of the operator. F.F.F. The fingers in the vagina.

When the placenta is situated over the cervix uteri, very alarming and dangerous flooding commonly occurs, from about the sixth or seventh month to the full period of gestation; and no woman can be said to be free from danger until she be delivered: hence the interposition of art is demanded, and must be timely applied, or the woman will be lost: and we are told these cases ought never to be trusted to the powers of nature.*

The manual assistance required in these cases, is to deliver the woman as expeditiously as the urgency of the case may demand. The precise time when the patient ought to be delivered must depend in every individual case upon the *quantity* of blood lost and the *effects produced.* When the delivery is determined upon, (the usual means for suppressing hemorrhage having failed), the operation should always be performed with the utmost deliberation. When the fingers reach the placenta, it is of little consequence whether we perforate it, or insinuate the fingers on one side till we come to the edge; though the latter is generally to be preferred, and when the os uteri is only partially covered with the placenta, (as here delineated), the hand may be passed by its edge to the membranes without difficulty, which is preferable to boring through the substance of the placenta.† So soon as the hand has attained admission into the uterus, the operation of turning is to be performed, under the guidance of the direction given under the operation of turning, (see Table VI). In bringing down the child, (as in all preternatural cases), it should be done gradually; the pressure of its body, as it advances, will stop the flooding; and should there be pains, the obstetrician must extract at such times, resting between; but if there be no pains, it may be proper to rest at intervals; for, by hurrying the delivery, the woman may be so much fatigued as to be in danger of instant dissolution; the flooding being stopped by the child's

* See Conquest's Outlines, Denman's Aphorisms, &c.

† Ryan's Manual, &c. Blundel's Lecture, &c.

body, the more immediate danger is checked; the head of the child being suffered to remain a little time in the vagina, will give the uterus opportunity to contract on the placenta, by which means it will be sooner expelled, and the flooding stopped.

The placenta, when situated over the os uteri, is much thicker than in common, but less in circumference. When examination takes place, particular caution should be observed, that coagulated blood be not mistaken for the placenta.

Fig. 2—Represents the same section of the parts, with a delineation of the placenta, situated directly over the os uteri.

In this situation of the placenta, it may be required to perforate the substance of the mass with the fingers, and to pass the hand to the feet of the child, and bring them down through the aperture.

Fig. 3—Represents the hand introduced into the uterus to remove the placenta, the funis being separated.

This accident, (the separation of the funis), may arise from great force being used in extracting the placenta; but sometimes it takes place when very gentle force only has been used; the funis being small and of a flimsy texture, or not being firmly united. The separation of the funis may be attended with some inconvenience to the young practitioner, should the placenta not be expelled by the action of the uterus in due time, (or if attended by flooding), being deprived of his immediate guide by the loss of the funis. But no great difficulty will be found by the operator who has a proper knowledge of the anatomy of the parts; the hand being cautiously introduced into the uterus, the placenta is to be gently withdrawn in the direction of the axis of the pelvis.

Fig. 4—Illustrates the detention of the placenta, caused by *adhesion* between the uterus and placenta.

This adhesion arises in consequence of the deposition of coagulable lymph from inflammatory action, which may have existed during gestation, probably caused by some external injury.* The adhesion is most frequently only partial, but sometimes unites the whole surface of the placenta to the uterus.

The unaided efforts of the uterus, as Dr. Conquest very justly observes, can never detach and expel the placenta under these circumstances; hence the interposition of art becomes necessary for its removal from the uterus. The hand of the obstetrician must be carefully introduced into the uterus, and, feeling for the edge of the placenta, cautiously and deliberately insinuating one, two, or more of his fingers between the placenta and uterus, slowly and tenderly separate the former from the latter. The hand should not be withdrawn until the separation is completely effected and uterine action excited.

* Vide Ramsbotham.

Fig. 5—Represents detention of the placenta, caused by irregular or spasmodic affections of the muscular fibres of the uterus, constituting the hour-glass contraction.

Spasmodic contraction of the muscular fibres of the uterus may occur either in the circular or longitudinal ones; when in the former, it produces either the hour-glass contraction, dividing the uterus into two cavities, (as represented in the drawing), or closes the cervix uteri, from which cause the placenta is detained. The management, in these cases, consists in allaying the spasmodic action, by the exhibition of an anodyne: from 40 to 60 minims of tincture of opium will generally have the desired effect; and, usually within half-an-hour, the constricted part becomes relaxed and dilatable, and the hand may be cautiously introduced into the uterus through the stricture.

TABLE VI.

THIS TABLE IS INTENDED TO ILLUSTRATE THE OPERATION OF TURNING.

Fig. 1—Represents a front view of the pelvis and uterus, the anterior portion of the uterus being removed to shew the situation of the fœtus, with left arm presenting, also the hand of the operator in the act of grasping the feet.

The position of the patient during the operation of turning is not very material, provided it is that which gives the operator the free use of his hand and arm. Some recommend that the patient should be placed on her hands and knees; and others, that she should lie on her back; but the usual position, i. e. on the right side, is probably as convenient as any; and during the operation it may be found convenient to change one position for another, under particular circumstances. The operation may be performed either with the right hand or the left; when the feet of the child lie forward to the forepart of the mother, the right hand will be usually found most convenient; but if the feet lie to the back of the mother, they will be most readily come at, by the operator using his left hand. Previous to commencing the operation, the arm should be laid bare, and, to facilitate its passage, the back of the hand and arm should be well smeared with some greasy substance, as pomatum, lard, sweet oil, or a lather of soap and water.

Fig. 2—Represents the same sections of the parts as the preceding drawing; in this, the hand of the operator is seen grasping both feet of the fœtus, and in the act of drawing them through the os externum, the presenting arm of the fœtus retracted, the back raised towards the fundus of the uterus, and the buttocks towards the right side.

It has been taught by most authors, to lay hold of both feet, as the turning is more readily and safely accomplished; but it will frequently happen, especially when the waters have been some time discharged, and the uterus strongly contracted round the body of the child, that we must be content to lay hold of one foot, rather than use any violence in our search for the other; a very intelligent teacher of midwifery, Mr. Radford, of Manchester, recommends in every case to turn with one foot only, believing that the extended extremity upwards secures the funis from compression during the passage of the body through the outlet.

Fig. 3—Illustrates the same section of the part, with the further advancement of the fœtus through the os externum, with the arms of the fœtus extended on each side of the head, the hand of the operator grasping the nates and thighs.

Fig 1.

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So soon as the nates are brought within the hollow of the sacrum, the case becomes precisely similar to a foot presentation; the object of the operator will now be to give such an inclination to the body of the child as will direct the face towards the back of the mother, *the most desirable position for the passage of the head:* if the toes of the child are turned towards the belly of the mother, the head must come in an unfavourable position; but, if the toes point towards either sacro-iliac synchrondrosis, the child is already advancing favourably.

In giving this inclination to the body, it is not necessary that the parts of the child should be completely turned, an inclination towards the mother's back being sufficient. The turn should be cautiously effected, without force, and during the time of a pain.

Fig. 4.—In this figure the further progress of the child towards delivery is seen; the head is represented in the cavity of the pelvis, the forehead turned to the hollow of the sacrum, and the occiput advancing from under the arch of the pubis, the right hand of the operator in the act of bringing down one of the arms.

In presentations of the lower extremities, and in those rendered so by the operation of turning, it is a question if it be best to deliver with the arms extended above the head, or to draw them down by manual assistance. We would say, in breech cases, where the labour has advanced slowly and without the interference of art, and in crural cases, where the os uteri has become perfectly relaxed and fully dilated, it may be attended with some advantages to bring down the arms, especially if there be any contractions of the pelvis, or the head of the child be large. But in presentations of the feet, or where the operation of turning has been performed, when from some untoward cause it has been thought expedient to hasten the passage of the body through the pelvis, it is often better not to attempt to bring the arms down, lest the os uteri should contract round the head; or, as some suppose, round the neck of the child,* and thus impede the passage of the head, or cause the death of the child.

To bring the arms down, we pass one or two fingers over the shoulder of the child as far as the bend of the elbow (see drawing), which is then to be gently depressed, when the fore-arm usually passes through the vagina with little difficulty.

Should the operator's fingers be unable to reach the head of the elbow, or not readily dislodge the arm, it would be prudent to give up the attempt, rather than risk an injury to the child.

In first pregnancies, it will require care, as the arm passes, to guard the perinæum from laceration.

"The head being brought into the cavity of the pelvis, and the face turned to the hollow of the sacrum," the body of the infant should be raised towards the abdomen of the mother, by

*Dr. Merriman "believes that it very rarely takes place round the neck of the child," and says "when it does happen, it is round the upper part of the child's head, girding it like a band, in a line just above the nasal bones in front, and below the projection of the occipital bone behind."

placing it on the left arm of the operator, as represented in the sketch, fig. 5. The index and middle fingers of the right hand are to be placed on the neck of the child, and the index of the left in the mouth, to depress the chin ; when gentle traction in the axis of the outlet, during uterine action, will usually accomplish delivery. Should there be no uterine action, we should excite it by friction on the abdomen, or by the ergot, or the child may be lost by pressure on the navel string.*

Sometimes considerable difficulty attends the passage of the head. Should the child be affected with hydrocephalus, the fluid must be let out by the trocar or perforator, either behind the ear or at the back of the neck.

The following caution should be attended to in performing the operation of turning:—

The hand should not be introduced during a pain, but in the interval.

The os uteri ought to be dilated to the size of a half-crown, and dilatable, to justify the introduction of the hand.

Care should be taken to ascertain correctly the position of the feet, before passing the hand.

The danger in turning arises from the contraction of the uterus round the body of the child: hence, when the uterus acts powerfully (the waters being discharged), we must overcome this resistance, by exhibiting fifty or eighty minims of the tincture of opium, or three grains of the gum; when anodynes fail, a copious bleeding may be tried. When these fail, it has been proposed to exhibit the tartarised antimony, so as to produce nausea.†

Turning ought never to be performed until the bladder and rectum have been evacuated.

The operation of turning is required when any part of the infant presents from the base of the skull to the breech; it is also required in floodings, when the placenta is attached over the os uteri, and in some other dangerous hæmorrhages, &c.; and also in some funis presentations.

* Ryan's Midwifery.

† Ryan's Manual, page 523.

TABLE VII.

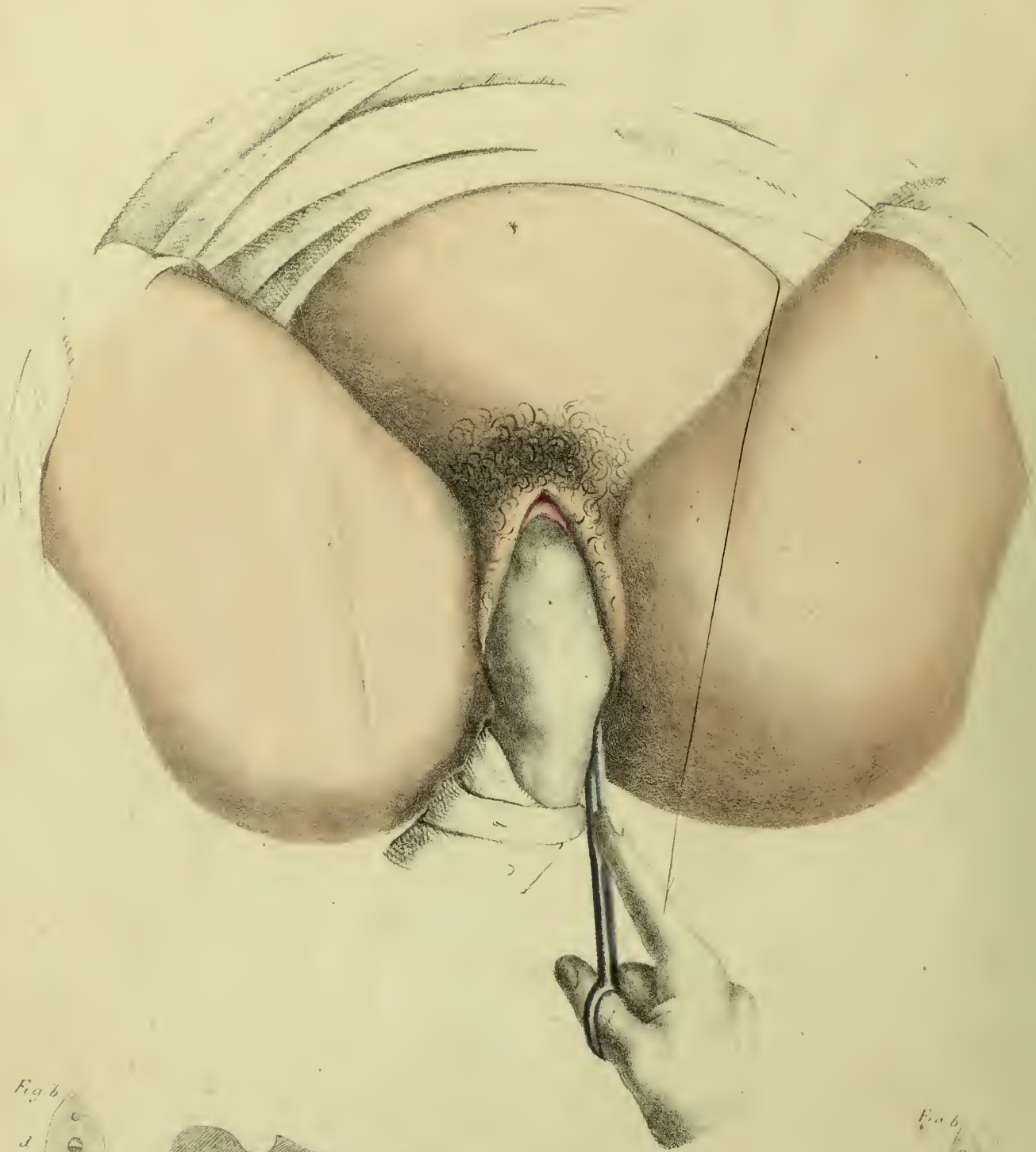

Fig. b

Fig. a

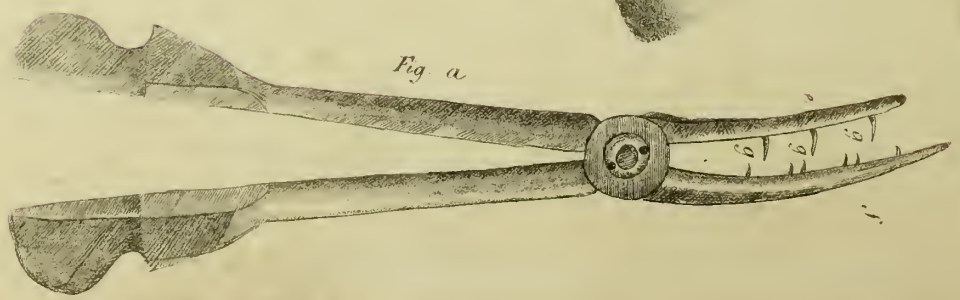

Fig. b

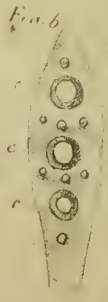

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TABLE VII.

ILLUSTRATING THE OPERATION OF CRANIOTOMY.

Preliminary Remarks.—The cases demanding this operation are those in which there is so much disproportion between the size of the head of the child, and space within the pelvis, as not to admit the passage of the former through the latter. This disproportion may arise either from the pelvis being contracted, or from the extraordinary bulk of the infant's head, or from tumor, &c. in the parturient passages: the former is the most frequent cause.

The precise diameter of the pelvis through which an infant at the full term of gestation can pass, without reducing the bulk of the head, has not been accurately nor satisfactorily determined. Dr. Clarke, of Dublin, says that $3\frac{1}{4}$ inches from pubes to sacrum is the least diameter through which he has known a full-grown fœtus to pass entire.* Dr. Osborn says $2\frac{3}{4}$ inches.† But the term *full-grown* fœtus is indefinite and unsatisfactory as regards the size of the fœtus; for one full-grown fœtus may readily pass through a diameter of $2\frac{3}{4}$ inches, whereas another would with difficulty pass a diameter of $3\frac{1}{4}$ inches; such is the disproportion between children born at full maturity: we can at all times more readily measure the diameter of the pelvis than ascertain the dimensions of the fœtal head.‡ Dr. Ryan says (Manual of Midwifery), "If the sacro-pubic diameter is only $2\frac{1}{2}$ inches, and the transverse or bis-iliac 3 inches, craniotomy is justifiable; but if the short diameter is only $1\frac{1}{2}$ inch, the operation would be useless, and dangerous."

Dr. D. Davis (Vide Elements of Operative Midwifery) has invented an instrument which he denominates the *osteotomist*, for breaking down the fœtal skull and bringing it away piece-meal. With this instrument he considers it practicable to deliver in cases of extreme distortion, when the diameter is less than two inches; and also recommends its use for breaking down the skull in preference to using much force, in cases less contracted.

Craniotomy may also be indicated if the fœtus be dead, and the parturient passages so contracted as to preclude the possibility of delivery either by the forceps, lever, or by turning, or when the head remains in the pelvis, and the hand, forceps, or blunt hook is insufficient for its extraction. This operation may now and then be demanded in face presentations and preternatural labours, when the head is too large to pass the superior aperture of the pelvis.

The time when the operation of craniotomy should be performed, must depend, in every case, on the state of the patient. It has been frequently performed too late to save the life of the patient. In cases of distorted pelvis affording no possible chance of a natural delivery, we should have recourse to the perforator so soon as the orifice of the uterus is sufficiently dilated to admit of its convenient and safe employment; but in cases of doubtful sufficiency of space to admit of a living birth, we must delay the operation so long as any chance remains of a natural delivery, consistent with the safety of the mother.

* See Transactions of the Dublin Association, &c. vol. i, p. 374.

† Essays on Midwifery (1794), p. 194.

‡ On the mode of measuring the pelvis, see Tab. III, Obstetric Tables.

DESCRIPTION OF TABLE VII.

Fig. 1—Represents the lower part of the abdomen, &c. the female lying in the dorsal position, with the left hand of the operator in the vagina, guiding the point of the perforator.

The operation of craniotomy may be performed when the patient is lying in the usual position, 'left lateral,' or as here represented; the latter is the most convenient for the operation.

On commencing the operation, an assistant should make gentle pressure on the abdomen, so as to keep the uterus steady and the head of the fœtus fixed during the operation.

The first part of the operation consists in introducing two or more fingers of the left hand into the vagina, then to carry them forward and place them, if possible, on the sagittal suture or anterior fontanelle, then introduce the perforator, and pass it along the palm and fingers till it reaches the head, and, with a semi-rotatory motion, penetrate the integuments and gently push forward the instrument, till it reaches the stops. (See C. fig. 2.)

On turning aside the parts of the drawing marked A, the relative positions of the *fœtus*, *pelvis*, *&c.* are brought into view, the anterior part of the uterus, &c. being removed, to demonstrate the situation of the fœtal head and bones of the pelvis, &c.

Fig. 2.—B. The head of the *fœtus*. C. The *Symphysis pubis*.
D. The *Sacrum*. E. The upper part of the *Vagina*.
F.F.F.F. The cut edge of the *Uterus* and *Vagina*.

The perforator being passed to the stops, or rests, we are now to open the blades to the extent of an inch or two, close them, and open them again transversely, so as to make a crucial incision. (See fig. 3, on turning down fig. 2.) The cerebral mass is now to be broken up by moving the blades in various directions. The blades should now be closed, and the instrument gently withdrawn from the vagina. The brain now generally escapes, the bulk of the head becomes considerably reduced, and the child may be expelled by the uterine contractions, without further interference. Should this not take place, unless some untoward symptoms demand immediate delivery, we may wait for some hours without any further interference, during which time the contents of the head will be forced out by the contraction of the uterus, the bulk of the head reduced, and the child may be expelled by the parturient pains; should this desirable circumstance not follow, the crochet or craniotomy forceps must be applied, to complete the delivery. (See fig. 4, on turning down fig. 3.)

Fig. 4.—Represents the same section of the parts described in fig. 2, with the crotchet introduced into the perforation of the cranium, and the

left hand of the operator in the vagina, to guard the passages against laceration, should the instrument slip from its hold, in drawing the infant through them.

The modern craniotomy forceps have now nearly superseded the crotchet,* as an extracting instrument; with the former we are enabled to use more power, with much less risk of doing violence to the parturient passages, and whichever instrument might be used, we must, in every stage of the extraction, draw down the head in the direction of the axis of the pelvis with great caution. The extracting force should be very moderate at first, but may be gradually augmented according to the exigency of the case. The operator should examine from time to time during the extraction if there be any pointed pieces of bone projecting beyond the integuments which might wound the passages; if so, they should be cautiously removed.

* There are many modifications of the craniotomy forceps recommended by obstetric teachers: of those we have seen, we give the preference to the forceps improved by Mr. Holmes. Fig. *a*. Table VII, is a sketch of that gentleman's forceps; he says, "they are to be introduced closed, till the point of the concave blade *h* reaches the perforation; it is purposely made longest, that it may slide over the outside, while the convex blade *i* begins to open and enter the perforation: this blade, *i*, is furnished with three chisel-shaped teeth *f.f.f.*; they enter, while closed, three corresponding holes, *k.k.k.* in the opposite blade. Fig. 3 shews the inner faces of the blade *h* and *i*; smaller pointed teeth are also fixed in the blade *h*, with small corresponding holes in the blade *i*; these secure the integuments, while the three chisel-shaped teeth pass through the bones of the head, and enter the perforations in the blade *h*."

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